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# The nature of humor appreciation: toward an integration of perception of stimulus properties and affective experience<sup>1</sup>

WILLIBALD RUCH and SIGRID RATH

## *Abstract*

*The present study attempts to determine at the experiential level the number and nature of dimensions of response to humor. A sample of 50 male and 50 female adults judged 24 jokes and cartoons on 17 seven-point rating scales. The set of ratings was empirically selected from spontaneous responses of subjects to a set of humor stimuli and represents a variety of aspects of reactions to humor. Positive and negative responses were recorded, as were judgments about perceived stimulus properties and subjects' own feeling state. Factor analyses of the intercorrelations among the response scales yielded one positive response factor ("exhilaration") and two negative response factors ("indignation" and "boredom"). In all three factors, the distinction between evaluation of stimulus properties and one's feeling state turned out not to be of importance. The high loadings of the stimulus ratings funny and witty, and of the feeling ratings exhilarated and amused, on a single factor representing all positive responses to humor are interpreted as supporting the view of the emotion of exhilaration advanced by Ruch (1990). Conservatism correlated positively with indicators of exhilaration and negatively with indicators of boredom in response to incongruity-resolution humor. Conservatism also correlated positively with indicators of indignation in response to sexual humor. The use of marker variables for all three response dimensions is recommended for future humor studies. It is suggested that supporting evidence for the negative response dimensions from the study of facial expressions in response to humor is necessary.*

Exhilaration was recently introduced as an emotion concept describing the behavioral, physiological, and experiential changes typically occurring in response to humor as well as to other stimuli, such as tickling or

laughing gas (Ruch 1990). It was proposed that the term *exhilaration* be used according to its Latin root (*hilaris*=cheerful) to denote either the process of making cheerful or the temporary rise in cheerful state (Ruch 1993). This was necessary since contemporary dictionaries show that *exhilarate* has two meanings: "To make cheerful, laugh, merry, glad, or joyous," and "to enliven" or "to make excited." The latter definition is de-emphasized in the proposed usage of the term.

Ruch (1990) reviewed the pertinent literature describing the three levels of exhilaration. His description of exhilaration behavior covered the facial behavior, gestures, and posture associated with smiling and laughing. Investigations of the physiology of exhilaration consider the identification of the physiological response pattern during exhilaration as well as the prerequisite neurophysiological conditions. The former includes such measures as the respiratory pattern, phonation and articulation, and cardiovascular, skeletomuscular, electrodermal, and electrocortical activity during smiling and laughing, while the latter focuses on the brain structures and neurohormonal activity involved. As with other emotions (Frijda 1986), the study of emotional experience includes the awareness of one's own actions and action tendencies, of physiological changes, and of the feeling structure, along with the awareness of the situation's meaning structure for the person and the perception of the properties of the exhilaration-inducing stimulus.

The concept of exhilaration fully incorporates what has traditionally been understood as the so-called "humor response," but it also goes well beyond it to provide an explicit emotional foundation. Typically, "humor response" refers to the perception of a stimulus as being "funny," although it also sometimes includes overt responses like smiling and laughter. However, the accompanying physiological changes, as well as other elements of emotional experience, typically are not included. Physiological processes have been studied, but the focus here has generally been on arousal changes underlying the processing of the humor stimulus, that is, the changes preceding rather than accompanying exhilaration. Basically, "humor response" is a concept of cognitive experience, regardless of whether it is or is not accompanied by smiling or laughter.

The failure to perceive a need to incorporate smiling or laughing and the perception of the stimulus as funny into one concept might have resulted from two facts. First, humor stimuli can be found funny without being accompanied by smiling or laughter. Second, smiling and laughing and funniness ratings were frequently observed to have only a moderate

positive correlation with each other (typically between .30 and .40; McGhee 1977). However, recent research has shown that contraction of the smiling muscles in positive affective states can occur at such a low level that they are not noticeable at the surface of the face (Schwartz, Brown, and Ahern 1980). Furthermore, the low intercorrelations reported between smiling and laughing and funniness have been shown to be most likely the result of methodological artifacts; the real size of the strength of the association is greater than .70 (Ruch 1990).

Thus, the concept of exhilaration broadens the scope of responses to humor to be studied. However, evidence that the elements added are an integral part of the responses induced by humor has not yet been provided. In particular, it has to be demonstrated that the perception of the stimulus as funny is associated with a change in feeling state. In other words, does the degree of perceived funniness of a cartoon or joke go along with the degree of felt exhilaration? Subjects in humor experiments readily judge the stimulus in terms of degree of funniness. Can they just as easily focus on their feeling state and judge the amount of amusement or exhilaration experienced? Finally, is this judgment of exhilaration predictably associated with the expressive behavior?

Preliminary results supportive of a close link between ratings of humor stimuli and subjective feeling states were obtained in a study of 110 Austrian adults who rated 48 jokes and cartoons on five seven-point scales (Ruch 1981). The ratings covered the degree of funniness of the joke/cartoon, induced exhilaration, perceived urge to laugh, like/dislike, and rejection (that is, a judgment that "this is not really humor"). A three mode factor analysis was performed to determine the number and nature of humor categories, response dimensions, and person dimensions. The analysis of the five scales yielded a strong "exhilaration" factor, which was loaded by the ratings of *exhilaration*, *laughter*, *funniness*, and *liking*. Thus, evaluations of the stimulus properties, self-report of laughter, and the subjective feeling state or experience were closely associated.

A minor "indignation" factor was also obtained, marked mainly by the *rejection* rating and also slightly by the *dislike* pole of the like/dislike scale. This factor was nearly orthogonal to the first one. Thus, there was no bipolar factor of positive versus negative responses; rather, the negative qualities were covered by a separate factor. This resembles the findings of research on moods, where positive and negative affectivity were found to be orthogonal factors (Watson and Tellegen 1985).

The Ruch (1981) study has several limitations. The dimensions to be rated were selected by the experimenter and were not based on the naturally occurring responses of a larger sample of subjects. Thus, it is not guaranteed that these dimensions reflect the language subjects would use to describe their immediate response to the jokes and cartoons. The failure of this study to adequately represent affective responses of a negative quality resulted in the negative response factor being inadequately defined. But the positive response scales might also be biased; for example, none of them focused on qualities like "clever" or "complex."

The present study was designed to analyze the structure of a larger set of possible responses to humor at the experiential level. The set of ratings used was not determined by the experimenter but was based on the spontaneous responses to the humor stimuli given by a small sample of subjects in a pilot study. Self-reports of laughter or smiling were not obtained. Only self-report data related to feeling states or properties of the stimulus were obtained. Also, terms for ratings derived from specific theories (superior, relief, etc.) as used by Wicker, Thorelli, Barron, and Ponder (1981) and Pollio and Talley (1991) will be avoided unless they are used in everyday language to describe one's spontaneous response to humor. A selected set of dimensions derived from the pilot study will then be given to a larger sample of subjects with the instruction to judge humor stimuli on all of the scales. The intercorrelations between the scales will be determined, and factor analyses will be performed on the resulting matrix to determine the number and nature of response dimensions underlying this set of ratings.

The jokes and cartoons to be rated are typical representatives of a comprehensive taxonomy of humor, consisting of the categories of incongruity-resolution humor, nonsense humor, and sexual humor (Ruch 1992). Thus, the results of this study should be highly generalizable. Separate factor analyses will be performed, based on the data for each type of humor, to estimate the stability of the factor pattern across the different humor categories. Finally, the degree of conservatism/liberalism will also be assessed. This personality construct has been shown to be more highly correlated than any other with the funniness of incongruity-resolution humor. The use of several response scales will allow an estimation of whether this relationship is restricted to the perception of funniness or whether it also covers other aspects of the affective experience.

## Method

### *Subjects*

The subjects were 100 adults (50 males and 50 females) between 18 and 30 years of age. Their mean age was 23.2 (SD = 2.3). Some of them were students, but psychology majors were not used.

### *Materials and procedure*

Subjects received one booklet containing the humor material and another containing the instructions and answer sheets. The test booklet included 24 jokes and cartoons, representing the humor categories of incongruity-resolution, nonsense, and sexual humor in equal number. The first three jokes and cartoons were “warm up” items which were not included in the scoring procedure. The subjects answered each item on a separate answer sheet. The first nine ratings referred to attributes of the stimuli and the remaining eight to the subject’s feeling state. The rating scales<sup>2</sup> were as follows: *witty, childish, aggressive, original, tasteless, subtle, embarrassing, funny, simple, exhilarated, bored, activated, indignant, puzzled, angered, amused, and unstimulated*. Accordingly, there were 24 pages of answer sheets, each containing the same set of 17 rating scales. Subjects were instructed to read one joke or cartoon and to make all judgments (that is, nine relating to perceived stimulus properties and eight relating to their own feeling states) before proceeding to the next one. The jokes and cartoons were given in the same order to all subjects, and the order of the rating scales was also fixed. Finally, 17 total scores were derived separately for each of the three humor categories (by adding the ratings for the seven jokes and cartoons composing each category) as well as for the total set of 21 stimuli.

### *Pilot study*

The set of 17 ratings was derived from a pilot study in the following way. A test booklet containing a set of jokes and cartoons was presented to pilot subjects individually, and they were asked to verbalize their immediate reactions to the humor using whatever terms came to mind. These

responses were recorded by the experimenter until newly tested subjects began to repeat descriptive terms used by previous subjects. This was repeated until no new words were used. Inspection of the compiled pool of these spontaneous responses revealed a greater variety of descriptive terms than are usually employed in humor experiments. The responses appeared to vary according to three features. First there were positive (for instance, funny, amused, clever) and negative evaluations (such as annoying, simple, feel angry). Second, the responses related to perceived joke properties (for example, funny, aggressive, dull) or to their own feelings (for instance, exhilarated, annoyed, surprised). Third, they related more either to structural properties and related cognitive states (such as clever, childish, puzzled) or to content aspects and related affective states (for instance, tasteless, embarrassing, angered). The 17 ratings used in the present study were derived from this list of generated terms.

Slang expressions and synonyms were eliminated. The final list was considered to represent all eight possible combinations of the three dimensions roughly equally well (for example, to include ratings referring to a positive affective state, positive affective joke property, negative affective state, negative affective joke property, etc.).

The subjects first answered the humor evaluation test and then several questionnaires. Among them was a fifty-item version of the Wilson and Patterson (1970) conservatism scale (C-scale). The items of the C-scale are presented in a catchphrase format and are answered in a three-point format (yes, ?, no). A total score for conservatism/liberalism was derived. The coefficient alpha in this sample was .92.

## Results

### *Factor analysis of the intercorrelations among response scales*

Intercorrelations among the 17 response scales were computed, both for categories combined and for each of the three humor categories.<sup>3</sup> The four matrices will not be discussed here in detail; however, the intercorrelations between judgments of *exhilarated* and of both *funny* and *witty* should be mentioned. They range from .82 to .92 with a mean of .86 and support the claim that the degree of perceived stimulus quality and induced exhilaration are strongly associated. For practical purposes these two judgments can be considered to be interchangeable.

Factor analyses were performed on the four intercorrelation matrices. The size of the eigenvalues indicated that three factors should be retained in each of the four analyses. These three factors explained 70.1% (all humor items combined), 69.6% (incongruity-resolution humor), 70.7% (nonsense humor), and 66.6% (sexual humor) of the variance. The three factors were rotated first by Varimax and then by Promax to obtain a more interpretable solution. The Promax factor patterns and the factor intercorrelations are presented in Table 1.

### *General factor pattern*

Table 1 shows that several features are stable across the different analyses. In general, one factor of positive evaluations and two factors of negative evaluations emerged. The positive evaluation factor is marked in each analysis by the perception of the stimulus as being *funny*, *witty*, and *original* and by reports of one's feeling state as being *exhilarated* and *amused*. This factor fuses the perception of the stimulus properties and the induced feeling state. It demonstrates that the perception of the humor stimulus as "funny" (as traditionally assessed in humor studies) and the induced emotion of exhilaration (as proposed by Ruch 1990) are two sides of the same coin. The label *funniness/exhilaration* was chosen to represent the two sides of this positive evaluation factor.

The negative evaluations can be separated into two clusters. Again, joke evaluation and reported feeling state fuse; however, the emotional versus cognitive ratings provide a distinguishing feature. The second factor is always loaded by the evaluation of the joke/cartoon as being *aggressive*, *tasteless*, and *embarrassing* and by the feeling states of *indignant* and *angered*. This factor combines the perceived aversive properties of humor and the corresponding negative states: an appropriate term might therefore be *offensive/indignation*. The third factor is loaded by the evaluation of the joke/cartoon as being *childish* and *simple* and by the feeling states of being *bored* and *unstimulated*. This factor represents the evaluation of cartoons and jokes as lacking stimulating properties, resulting in a state of underarousal. This factor has accordingly been labeled *simple/boredom*.



Table 1. *Promax factor pattern for the 17 rating scales and factor intercorrelations for all humor categories combined and separated*

Rating scales	All categories			INC-RES			Nonsense			Sexual humor		
	I	II	III	I	II	III	I	II	III	I	II	III
Witty	.98	-.20	.01	.80	-.32	-.09	.66	.01	-.39	.92	-.03	.02
Funny	.94	-.05	-.01	.85	-.08	-.09	.66	.04	-.45	.87	-.01	-.07
Exhilarated	1.00	-.17	.04	.92	-.23	.05	.72	-.06	-.31	1.03	-.04	.16
Amused	.98	-.11	.12	.91	-.22	.13	.80	-.11	-.20	.85	.06	-.08
Original	.70	.25	-.08	.75	.16	-.22	.83	-.01	-.11	.77	.07	-.05
Subtle	.39	.41	-.15	.78	.11	-.08	.69	.13	-.08	.02	.41	-.76
Activated	.35	.53	-.05	.79	.28	.05	.91	-.03	.19	.03	.53	-.71
Puzzled	.31	.70	.07	.50	.63	.04	.96	.03	.32	.30	.81	-.05
Aggressive	.21	.65	.08	.32	.52	.16	.26	.74	-.05	.03	.74	-.14
Tasteless	-.10	.83	.01	-.08	.81	-.03	-.23	.89	-.22	.05	.70	.24
Embarrassing	-.23	.94	-.09	-.22	.92	-.20	-.08	.85	-.08	.10	.81	.09
Indignant	-.21	.97	-.06	-.14	.89	-.08	.06	.74	.19	-.14	.89	-.08
Angered	-.17	.87	.08	-.13	.80	.13	.05	.49	.42	-.25	.84	-.07
Childish	-.15	-.20	.46	-.05	.10	.54	.02	-.11	.81	.08	.22	.55
Simple	-.07	-.10	.71	-.10	.12	.57	-.05	.08	.69	.11	.24	.71
Bored	-.05	-.04	.88	-.14	-.08	.85	-.10	-.02	.82	-.40	.33	.28
Unstimulated	.21	-.08	.95	.04	-.12	.97	.03	-.04	.90	-.05	.35	.54
Factor intercorrelations												
I	1.00	.36	-.35	1.00	.03	-.49	1.00	.17	-.45	1.00	.01	-.58
II		1.00	.26		1.00	.43		1.00	.37		1.00	.17
III			1.00			1.00			1.00			1.00

Note. INC-RES = incongruity-resolution humor.

*Patterns of loadings of rating scales across humor types*

The loading patterns across the three humor types were remarkably stable. However, interesting differences also emerged. For incongruity-resolution and nonsense humor, the ratings of *subtle*, *activated*, and *puzzled* load on response factor I, while for sexual humor these same ratings load on response factors II and III. Thus, for the two structure-dominated humor categories, a positive evaluation of structural properties goes along with the degree of *funniness/exhilaration*. These properties do not play this role in response to the content-dominated category of sexual humor. Furthermore, while being *puzzled* loads only on response factor I for nonsense humor, it loads equally well on response factor I and II in the analysis of incongruity-resolution humor. Thus, being *puzzled* is a clear marker for *funniness/exhilaration* for nonsense humor, but it is associated with negative affects in response to resolvable types of humor.

For sexual humor, these three evaluations are part of the two negative response factors. Although being *puzzled* by sexual humor also goes along with *funniness/exhilaration*, its main loading is on the *offensive/indignation* factor. This suggests that a direct and overt presentation of tendentious themes can be puzzling, too. *Subtle* and *activated* form the negative pole of the *simple/boredom* factor. Thus, the rating scales relating to structural properties and the associated mental states were the ones which were most dependent on the type of humor evaluated. Only two of the negative response scales had factor patterns differing as a function of the type of humor rated. *Angered* also loaded on the *simple/boredom* factor for nonsense humor, and *bored* marked the negative pole of the *funniness/exhilaration* factor for sexual humor.

*Intercorrelation between the response factors*

The intercorrelations confirm that the degree of exhilaration and of negative emotions induced by the cartoons and jokes are independent of each other; response factors I and II are not correlated in any of the three analyses. Response factors I and III are highly negatively correlated in the three separate analyses as well as in the total pool. Thus, states of exhilaration and boredom are more or less incompatible. Not surprisingly, for the structure-dominated humor categories the degree of negative cognitive evaluation and the overall negative evaluation intercorrelate

positively. Likewise, for sexual humor, the negative cognitive evaluations do not contribute to general aversiveness.

### *Mean response profile of the three humor categories*

Next it was examined how the three humor categories differ with respect to the 17 rating dimensions. A repeated measures ANOVA with types of humor (incongruity-resolution, nonsense, and sexual humor) as a repeated measurement factor was computed for all response scales. The means, F-ratios, and P-values are presented in Table 2.

Table 2 shows that the three humor categories were judged to be equally funny and witty and that subjects considered themselves to be equally strongly exhilarated, amused, activated, angered, bored, and unstimulated in response to each type of humor. Sexual humor (as compared to the structure-dominated humor types) was rated higher on tasteless, embarrassing, aggressive, simple, and felt indignation and lower on subtle and

Table 2. *Mean response profile for the three humor categories*

Rating scales	INC-RES	Nonsense	Sexual humor	F	p
Witty	3.727	3.714	3.769	0.078	n.s.
Funny	3.644	3.553	3.379	2.025	n.s.
Exhilarated	3.503	3.490	3.453	0.081	n.s.
Amused	3.359	3.304	3.229	0.485	n.s.
Original	3.499	3.739 <sup>b</sup>	3.189 <sup>a</sup>	7.861	***
Subtle	2.701 <sup>b</sup>	2.943 <sup>b</sup>	2.424 <sup>a</sup>	13.915	***
Activated	2.387	2.477	2.433	0.397	n.s.
Puzzled	2.230 <sup>a</sup>	2.606 <sup>b</sup>	2.460 <sup>b</sup>	9.221	***
Aggressive	2.589 <sup>b</sup>	2.046 <sup>a</sup>	2.763 <sup>b</sup>	31.802	***
Tasteless	2.630 <sup>b</sup>	2.213 <sup>a</sup>	3.649 <sup>c</sup>	92.305	***
Embarrassing	1.870 <sup>a</sup>	1.764 <sup>a</sup>	2.840 <sup>b</sup>	69.526	***
Indignant	1.783 <sup>a</sup>	1.680 <sup>a</sup>	2.184 <sup>b</sup>	17.861	***
Angered	1.961	1.931	2.047	0.620	n.s.
Childish	3.890 <sup>b</sup>	3.829	3.564 <sup>a</sup>	3.705	*
Simple	3.613 <sup>a</sup>	3.416 <sup>a</sup>	4.197 <sup>b</sup>	22.072	***
Bored	3.504	3.614	3.484	0.561	n.s.
Unstimulated	3.247	3.287	3.409	0.786	n.s.

Note. The F-Values were obtained from a repeated measurement ANOVA.

INC-RES = incongruity-resolution humor.

<sup>a,b</sup>Means with different superscripts differ at  $P < 0.05$  (Scheffé-Test).

\* $P < .05$ . \*\*\* $P < .001$ .

childish. Nonsense was rated higher on original than sexual humor. Both incongruity-resolution and sexual humor were considered to be more aggressive than nonsense humor, and incongruity-resolution humor was higher on tasteless than nonsense. Finally, both nonsense and sexual humor were considered to induce more puzzlement than incongruity-resolution humor.

*Intercorrelations among types of humor for different response scales*

The ability of the different response scales to discriminate among the three humor categories was examined next by computing intercorrelations among incongruity-resolution humor, nonsense humor, and sexual humor separately for each of the 17 total scales. These coefficients are presented in Table 3.

Table 3 shows that low coefficients were mainly associated with perception of the stimulus of being *witty*, *funny*, and *original* and with feeling states of being *exhilarated*, *amused*, and *bored*. For the other response

Table 3. *Intercorrelations among the three humor categories for the 17 rating dimensions*

Rating scales	INC-RES/ Nonsense	INC-RES/ Sexual humor	Nonsense/Sexual humor
Witty	.19	.19	.17
Funny	.23*	.17	.01
Exhilarated	.30**	.38***	.23*
Amused	.22*	.36***	.21*
Original	.15	.13	.06
Subtle	.43***	.45***	.36***
Activated	.45***	.50***	.56***
Puzzled	.67***	.77***	.71***
Aggressive	.68***	.66***	.51***
Tasteless	.66***	.40***	.39***
Embarrassing	.72***	.57***	.44***
Indignant	.66***	.50***	.50***
Angered	.52***	.47***	.21*
Childish	.46***	.52***	.38***
Simple	.50***	.30**	.32**
Bored	.26**	.24*	.31**
Unstimulated	.41***	.49***	.23*

Note. INC-RES = incongruity-resolution humor.

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$ . (d.f. = 98).

scales, coefficients higher than .30 were typically obtained. Higher inter-correlations imply that generalized individual differences in this response category exist. For example, some individuals have a general tendency to perceive all kinds of humor as being more aggressive than others do, or some people are generally more easily offended than others by certain types of humor. These individual differences add to the variance in appreciation of particular types of humor and result in positive relationships among all categories.

An interesting pattern emerged for the five negative affect scales. Whereas the structure-dominated humor categories correlated very highly with each other on these scales, the correlation of both incongruity-resolution and nonsense humor with sexual humor using the same scales was much lower. The high correlation between the structure-dominated scales for these negative affect scales represents a general tendency to respond to humor more or less aversively. Due to its "tendentious" content, however, sexual humor provides an additional source of variance; some find it tasteless and some do not, which serves to lower coefficients involving the sexual humor.

#### *Correlations between conservatism and evaluation of the cartoons*

To determine the relationship between conservatism and evaluation of the three humor categories, correlations between the C-scale and the total scores for the 17 ratings were computed. The results are presented in Table 4.

Table 4 shows that the pattern of correlations with the C-scale does not follow the pattern of the factor loadings described above. Conservatives found incongruity-resolution humor more *witty*, *funny*, and *original*, and they reported a higher degree of *exhilaration* and *amusement* than did liberals. However, conservatives and liberals did not differ significantly from each other in their evaluations of incongruity-resolution humor on the other markers of *funniness/exhilaration*, namely *subtle*, *activated*, and *puzzled*. The negatively toned response scales did tend to be inversely related to conservatism, but only three were significant and they did not come from only one response factor. Conservatives reported less *anger* and *boredom* in response to this type of humor and found incongruity-resolution humor less *simple* than did liberals.

Conservatives reported being less *activated* in response to nonsense

Table 4. Correlations between conservatism and responses to the three humor categories

Rating scales	INC-RES	Nonsense	Sexual humor
Witty	.42***	-.02	.02
Funny	.27**	.00	-.03
Exhilarated	.30**	-.05	.08
Amused	.43***	-.07	-.09
Original	.39***	.03	.17
Subtle	.16	-.08	-.06
Activated	.07	-.22*	-.27**
Puzzled	.18	.02	.12
Aggressive	-.07	-.03	.05
Tasteless	-.15	.05	.29**
Embarrassing	-.10	-.13	.32**
Indignant	-.10	.01	.25*
Angered	-.28***	-.06	.09
Childish	.00	.04	.07
Simple	-.27**	-.07	.00
Bored	-.28**	-.07	-.12
Unstimulated	-.19	.11	.14

Note. INC-RES = incongruity-resolution humor.

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$ . (d.f. = 98).

and sexual humor than did liberals. Furthermore, conservatives found sexual humor more *tasteless* and *embarrassing* than liberals and reported more *indignation*. Thus, conservatism goes along with a low threshold for reacting to sexual humor emotionally. Liberals and conservatives did not differ, however, with respect to *anger* or *aggressive*.

## Discussion

The aim of the present study was to identify the number and nature of experiential dimensions associated with the response to humor. Based on the pattern of intercorrelations of 17 humor response scales, three factors accounting for about 70% of the variance could be extracted. The most distinguishing feature of the data was the hedonic tone of the evaluation; positively and negatively toned ratings were found to load on different factors. Positive responses yielded only one factor, but the negative responses were split up into two dimensions. All three factors contain evaluations of both stimulus properties and evaluation of the respondent's

feeling state: thus, this distinction between evaluations of the stimulus and the respondent's emotional reactions to the stimulus turns out not to be of importance.

### *The positive humor response dimension*

The main dimension of reactions to humor describes the strength of positive affect evident in both the stimulus evaluation and the respondent's induced feeling state. In order to represent both domains in the factor name, this dimension was labeled *funniness/exhilaration*. The stimulus-directed side of this factor has generally been referred to in the past as the "humor response." The fact that all positively toned stimulus evaluations load on this factor supports this concept. However, the fact that the induced feelings of exhilaration and amusement also load on it gives support to the claim that the "humor response" is only one element in the more broadly defined construct of the emotion of exhilaration (Ruch 1990). Thus, at the experiential level, when people react to humor, their awareness is not restricted to perceiving the joke as funny; they are also aware of changes in feeling state, of physiological changes, and of their actions and action tendencies. In other words, people also experience a temporary rise in positive state, have feedback from bodily reactions during laughter, and can feel the urge to laugh even when the expression of laughter is suppressed. The perception of the need to laugh was shown to load on a factor of *exhilaration* in a prior study (Ruch 1981); evidence that other elements of the experiential level go together remains to be provided. Furthermore, it is necessary to emphasize that the exhilaration factor in the present study was extracted from experiential data only, whereas the exhilaration construct put forward by Ruch (1990) also incorporates accompanying behavior and physiological changes. It remains to be demonstrated that the degree of exhilaration at the experiential level goes along with a corresponding intensity at the levels of behavior and physiology.

Nevertheless, the present study confirms that the concept of "humor response" can be integrated into the broader construct of the emotion of exhilaration. The fact that the degree of perceived funniness of the humor stimuli correlated very highly with the strength of felt exhilaration suggests that the results obtained for funniness in prior humor research can be transferred to the domain of felt exhilaration. Indeed, if it turns out

that subjects are more comfortable judging the stimulus rather than their own feelings, researchers might continue to use the funniness scale as the main experiential variable in experimental humor research. However, the argument put forward here is that reactions to humor should be conceptualized at a broader level (one which also takes the emotional nature of one's response to humor into account) rather than being restricted to the level of the perception of the stimulus as being funny. Likewise, in experiments on other emotions, it makes sense to judge the eliciting stimulus on dimensions like *menacing*, *dangerous*, *annoying*, *upsetting*, or *ugly* while describing the phenomena studied in terms of such emotion concepts as *fear*, *anger*, or *disgust*. *Amusement* (which also correlates highly with both funniness and exhilaration) and *mirth* have not been considered by prior humor researchers to be satisfactorily distinctive labels for the emotion induced by humor (McGhee 1979).

The location of exhilaration within typologies and dimensional models of emotions has yet to be studied. Within the former, it is obvious that exhilaration is a facet of the family of positive emotions. However, studies are needed to help distinguish between exhilaration and other types of positive emotions, such as happiness, contentment, gladness, or joy. With respect to dimensional models, it has been suggested that Wundt's (1903) descriptive dimensions of feelings may serve as a frame of reference to locate exhilaration (Ruch 1990; Wilson 1979). In his three-dimensional model containing the axes pleasantness/unpleasantness, excitation/quietness, and strain/relaxation, exhilaration might be described as a pleasurable, relaxed excitation. It might be of interest to determine the weight of the three dimensions empirically. Measures of felt exhilaration, physiological changes, and overt behavior might serve as criteria for ratings of degree of excitement, pleasure, and relaxation.

Despite the high correlation found between *funny* and *exhilarated* in the present study, this relationship cannot be generalized to all situations. For example, under conditions of repeated exposure to the same humor material, perceived funniness might be only slightly reduced, but the degree of exhilaration (as it is felt or as expressed in smiling or laughter) might cease. Such an effect was demonstrated for funniness ratings and overt behavior by Gavanski (1986). It can be hypothesized that the changes in felt exhilaration would parallel changes in overt behavior rather than the changes in perceived funniness of the humor stimuli. However, there are no grounds to reject the view that perceived funniness and expressive behavior are indicators of the same emotion construct



(Gavanski 1986; Porterfield, Mayer, Dougherty, Kredich, Kronberg, Marsee, and Okazaki 1988).

*Two dimensions of negative responses to humor*

While the factor of *exhilaration* obtained in the present study replicates the results of Ruch (1981), the unitary factor of negative responses found there was not replicated. In contrast to the findings for positive evaluations, the distinction between affective and intellectual judgments proved to be important for negative evaluations because the rating scales calling for affective and intellectual judgments form separate factors. One type of negative response to humor (*offensive/indignation*) describes the level of negative affect in both perceived stimulus quality and the respondent's induced feeling state. The stimulus-directed side of this factor describes the tendency to perceive the jokes and cartoons as being *offensive*. On the recipient-directed side, this factor amounts to a tendency to respond with *indignation*. The terms labelling this factor were chosen to reflect the possibility that *moral* and *ethical* feelings may be hurt by particular types of humor and that individuals may use this response dimension to indicate this. Conservative subjects liked sexual humor as much as liberals did, but they showed greater signs of indignation in response to sexual humor than did liberals. As with the *aversiveness*-scale in the 3 WD humor test (Ruch 1992), it is mainly sexual humor which is rated high on indignation; the more structure-related humor categories are less frequently considered to be offensive. The present study also supported prior findings of a general tendency among some individuals to find offensive qualities in all three types of humor. Personality dimensions like neuroticism or tenderminded attitudes have been shown to be predictive of a low threshold for finding humor aversive (Ruch 1992).

The terms chosen to characterize response factor II cover a broad range of negative affects which can be induced by humor. These can be discrete and clearly distinct emotions, such as anger, disgust, or contempt. When there is reason to think that the humor material to be studied may induce such negative feelings, these feelings should be assessed along with the positive ones. More importantly, the study of the negative emotions induced by humor should incorporate facial expressions since they allow for a valid inference of the nature of the emotions present. The presence of negative facial displays in response to humor has already been reported and globally assessed by Redlich, Levine, and Sohler (1951). Some of

these displays have also been studied utilizing a more sophisticated technique for scoring facial expressions, the Facial Action Coding System (Ekman and Friesen 1978). Keßler and Schubert (1989) showed that during a short episode of offensive humor in a Jerry Lewis movie, facial displays of disgust and contempt were present quite frequently. Furthermore, one facial sign of contempt (unilateral contraction of the zygomatic major and buccinator muscles) was observed to be displayed in response to jokes and cartoons (Ruch 1990).

The other type of negative response to humor (*simple/boredom*) describes the strength of intellectual dissatisfaction in both the perceived quality of the stimulus and the associated state of understimulation. Perhaps this response dimension is used to indicate that the structural properties of jokes and cartoons are below one's standards; that is, they are of insufficient intellectual quality. The resulting experience is one of boredom. This factor did not emerge in the earlier study (Ruch 1981) because marker variables representing it were not included in the set of rating scales studied there. However, the means in Table 2 suggest that this is a common response to humor and underscore that this is an important response dimension. The high negative correlation found here between the boredom and exhilaration factors raised some doubts about the utility of this factor; one might argue that the responses covered by *simple/boredom* can be better conceptualized as representing the low end of the exhilaration dimension. There are two counter arguments to this view. First, while the *exhilaration* factor covers only positive (that is, the range from *not at all* to *very positive*) responses but no negative responses, the tone of the four ratings scales loading on this factor is negative (although much less so than the one of the marker variables for the *indignation* factor). Second, judgments of *boring* and *childish* tend to accompany negative facial displays, like unilateral contraction of the zygomatic major and buccinator (that is, the contempt smile), unilateral contraction of zygomatic major for less than 2/3 of a second (that is, a smile containing two markers of faked smiles), or the unilateral contraction of the caninus muscle (Ruch 1990). Responses on this dimension tend also to be generalized across humor categories, although the mean size of these intercorrelations is lower than the one for *offensive/indignation*. Personality variables such as sensation seeking and a need for complexity might account for generalized individual differences on this response dimension, but studies along these lines have not yet been completed.

Thus, there are several differences between these two kinds of negative response to humor. First, the former tends to have more of an affective and the latter more of a cognitive quality. Second, the former might be more sensitive to the content of the humor stimulus, whereas the latter relates more to structural properties of humor. Third, the negative tone of the former is stronger than that of the latter. Fourth, based on the means of Table 2, the former has a higher threshold than the latter; that is, people more readily experience boredom than indignation in response to humor. The nature of these negative humor response dimensions should be further explored by studying any accompanying facial expressions. Recent advances in research on emotion and nonverbal behavior provide the tools needed for a differentiated assessment of facial expression (like the FACS, Ekman and Friesen 1978) as well as a rationale for inferring the nature of emotion displayed.

It is obvious that much of subjects' natural reactions to humor is not assessed if only a funniness scale is used in empirical studies of humor. The failure to assess negative response dimensions in experimental humor research might result in a failure to verify hypotheses. A given treatment might not result in reduced perceived funniness of humor, but it may induce negative states of the type described by the two factors obtained here. For example, several models postulate an inverted-U function between a critical stimulus variable (like, for example, degree of incongruity, complexity, or arousal potential) and the resulting funniness (Berlyne 1972; McGhee 1976; Suls 1972; Zigler, Levine, and Gould 1967). Typically, it is assumed that funniness is maximal only at an optimal moderate level of this stimulus variable. If the optimal level is exceeded, funniness diminishes and the hedonic tone becomes increasingly negative. Funniness also decreases the more the stimulus variable is below the optimal level.

Apart from McGhee's (1976) study using children, convincing empirical evidence for such hypotheses is still missing. Ruch (1990) argued that the failure to verify such hypotheses might be associated with the sole use of "funniness" as a dependent variable. It might well be that the deviation from the optimal level is better reflected in increased negative affect rather than in decreased positive affect. For example, it appears that the scales covered by response factor III (childish, simple, bored) are more sensitive to deviations below the optimal level, while the scales associated with response factor II (aggressive, embarrassing, anger) are more sensitive once the optimal level is largely exceeded. It is puzzling that researchers

typically use negatively-toned terms to describe the responses to deviation from the optimal level. Yet when it comes to empirical investigations, these same researchers use only a scale covering the positive quality (for instance, funniness, from not at all funny to very funny) of reactions to the humor stimuli presented.

Investigators should also use representative response scales in future studies on humor appreciation and personality. In the 3 WD humor test, the jokes and cartoons are rated for both funniness and aversiveness, and it generally turns out that these two scales correlate differently with personality variables (Ruch 1992; Ruch and Hehl 1985). In the present study, the use of a broader variety of response scales provided more insight into the relationship between humor appreciation and conservative attitudes. Conservatives react more favorably to incongruity-resolution humor than liberals do (Ruch 1992). This tendency, however, is not extended to all of the response dimensions involved. Conservatives tend to respond with greater exhilaration, whereas liberals tend to be primarily bored and angered. There is, however, no difference between conservatives and liberals with respect to negative evaluations as covered by the *offensive/indignation* factor. This underscores that incongruity-resolution humor is primarily a structural humor category and that the content is less important in this type of jokes and cartoons. Conservatives and liberals do differ, however, with respect to feelings of indignation or judgments of tasteless or embarrassing in response to sexual humor. Conservatives react with moral rejection to sexual humor, although they find it just as funny and exhilarating as liberals do. This supports the view that the indignation factor is highly sensitive to conflicts between humor and moral or ethical standards.

### *Interaction between type of humor and response dimensions*

In general, the different analyses yielded similar factor patterns. It was no surprise, however, that the factor composition of the more intellectual response dimensions differed as a function of the humor category evaluated. It is obvious that collative variables (Berlyne 1972) play a different role in types of humor in which either the resolution of incongruity, the unresolved incongruity, or the content is central.

In incongruity-resolution and nonsense humor the exhilarating potential results mainly from the structural properties of the joke or cartoon; hence, evaluation of these properties will be more crucial in determining

the hedonic tone of the emotional response induced than would be the case for sexual humor. Theoretically, in nonsense humor a residue of incongruity is always left which contributes to perceived funniness (McGhee, Ruch, and Hehl 1990). Not surprisingly, in the case of nonsense humor, being puzzled loads only on the positive evaluation factor; that is, the degree of puzzlement accompanies perceived funniness of humor. In incongruity-resolution humor, the incongruity *and* the resolution contribute to the perceived funniness. In contrast to nonsense humor, the incongruities within jokes and cartoons of this form of humor can typically be resolved completely. A failure to resolve them might induce puzzlement which is not perceived positively (Suls 1972). Thus, the additional loading of *puzzled* on response factor II might reflect the negative emotions associated with the inability to resolve the incongruity.

In the case of sexual humor, both structure and content contribute to perceived funniness. But subjects can respond to these two dimensions differently. They may like the one but dislike the other. Thus, variations in this two ingredients of humor might have caused the slightly different factor pattern obtained for the response scales. The structure-related attributes form a bipolar evaluative factor composed by positive attributes on one end (*subtle, activated*) and negative on the other (*simple, childish, unstimulated*). This is the only case in which positive and negative attributes load on the same factor. The two negative response factor are also orthogonal for sexual humor, whereas they are positively correlated for the other two humor categories. Thus, the differences in factor pattern are quite plausible and can support the validity of the taxonomy of jokes and humor advanced (Ruch 1992).

Thus, while the positively-toned structure-related ratings prove to be sensitive to differences in type of humor (for instance, the relative contribution of incongruity, resolution, or joke theme), they are too unstable as markers for the three humor response factors identified in the present study.

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## Notes

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2. The original German terms used were *witzig*, *kindisch*, *aggressiv*, *originell*, *geschmacklos*, *geistreich*, *peinlich*, *lustig*, *niveaulos*, *erheitert*, *gelangweilt*, *angeregt*, *entrüstet*, *verblüfft*, *verärgert*, *amüsiert*, and *angeödet*.
3. The correlation matrices can be obtained from the authors.

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